Monitoring and managing resources in the sea

A profile of Fisheries Biologist Jeff Miller

INVENTORY AND MONITORING NETWORKS OF THE National Park Service are charged with monitoring their parks' resources. For much of the South Florida/Caribbean Network, resource monitoring has to be done under water. "More than half of this planet is under water," says Jeff Miller, "so I have the 'majority' view." Jeff, a fisheries biologist for the network, received the 2006 Director's Award for Professional Excellence in Natural Resources for work performed in 2005 for, among other accomplishments, developing a scientifically rigorous methodology for monitoring coral reefs. He developed the sonar-based random sample selection protocol for establishing long-term coral reef monitoring sites. This protocol was one of only three that satisfied the rigorous sampling criteria of reviewers for the *Journal of Coral Reefs*, who examined 119 such monitoring techniques from around the world.

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initiated a coral bleaching event in 2005 that was thoroughly documented at Buck Island Reef National Monument and Virgin Islands National Park (see article, page 43). This detailed video record of a bleaching event not only is of great interest to scientists but also suggests that there is a way to manage these events. The data revealed that when the corals were stressed by temperature, disease took advantage and was responsible for almost all the death that occurred. Managers of marine parks cannot turn back record warm water temperatures that may be related to global warming, but research may enable them to control the disease that wreaks destruction under excessively warm conditions.

The enabling legislation for Virgin Islands National Park mandates park protection of the coral reefs. In the 2005 event, 51% of the coral was lost from the study site, about 25 acres (10 ha) of what had been some of the most diverse, complex, and coral-rich reefs in the area, growing since about the time that Christopher Columbus was sailing the Caribbean. "We need to raise the alarm that we are rapidly losing this resource," Jeff says, "and we need to focus a whole lot of effort to addressing this situation. There are things that we can do right now to protect the reefs, like control sedimentation, reduce overfishing, eliminate anchor damage, and participate in the public debate. But with bleaching and disease, there is more we need to learn."

Jeff's work is used in marine parks throughout the National Park System. He first saw the need for an inexpensive alternative to the sonar-based protocol while working with monitoring programs in other Caribbean countries, and responded by developing a protocol using handheld Global Positioning System (GPS) units that also produce results that meet scientifically rigorous standards. This system is used in U.S. national parks wherever the sonar-based technology is infeasible. His training sessions in dive physics, physiology, and in-water accident response have been filmed and are used throughout the National Park Service.

In addition to tracking the condition of corals, Jeff was involved in developing methodology and surveying large areas of Virgin Islands National Park to map anchorages that are safe for both vessels and resources. To aid local fishers in navigating those waters, he developed a program to teach them the use of GPS so that they can identify park boundaries and no-fishing areas and increase their safety at sea.

Jeff's work contributes to understanding the marine environment in his network, throughout the National Park Service, and internationally. But he is quick to recognize that he is part of an enormous team effort involving the whole network, the U.S. Geological Survey, and the Student Conservation Association. "When we started monitoring the bleaching event, monitoring quadrupled, and keeping up with that schedule took a whole dedicated team to accomplish." ■

—Betsie Blumberg, Associate Editor, *Natural Resource Year in Review*